UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,474	03/19/2001	Motoyasu Terao	ASA-991	8982

10

24956 7590 10/03/2003

MATTINGLY, STANGER & MALUR, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER	
ANGEBRANNDT, MARTIN J	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 10/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/810,474	TERAO ET AL.	
	Examiner	Art Unit	
	Martin J Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11 and 16-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *20* is/are allowed.

6)☐ Claim(s) *2-11,16-19 and 21-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. The response provided by the applicant has been read and given careful consideration. Responses to the arguments and amendments are presented below after the first relevant rejection. Rejection of the previous office action not repeated below are withdrawn based upon the arguments and amendment of the applicant, particularly, the addition of the interfacial layers to the claims. Basis for the language concerning the composition of the interfacial layer is found on pages 18 an 19 of the instant specificaiton.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3b Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 3, "lest" should read - - least- - .

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2,3,5-11,16-18, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou '573, in view of Kojima et al. '837.

Examples 2 and 3 have a structure shown in figure 1 and described at 6/12-37 and use phase change recording layers. In example2, the layer 6 is 55 nm of Ge and the reflective layer

(8) is 100 nm aluminum. In example 3, the layer 6 is 35 nm of Mo and the reflective layer (8) is 100 nm aluminum.

The dielectric between the recording layer and layer 8 is 5 nm and the dielectric layer (7) between the layers (6) and (8) is 20 nm. The thickness of the lower dielectric layer may be between 70 and 280 nm (4/40-49). The reflective layer may be metals such as Al, Ti, Au, Ni, Cu, Ag, Rh, Pt, Pd, Ni, Co, Mn, Cr and alloys of these. (4/36-39). Useful materials for the light absorbing layer include Mo, W, Pd, Pt, Co, Ni, Mn, Ta, Cr, Ti and Hf and may have thicknesses of between2 and 200 nm depending upon absorption (3/15-33). Useful pitches are between 0.6 and 1.2 microns, with decreasing pitch increasing the possible data density (5/47-57 and 1/39-60).

Kojima et al. '837 teach the use of inteface layers between the phase change recording layer and adjacent dielectric layers to prevent migration between these layers. The use of oxide, carbides, nitrides or oxynitrides of Si, AL, Zr, Ti, Ge, Ta, Cr or mixtures thereof is disclosed. (10/51-11/4)

It would have been obvious to modify the cited examples of Zhou '573 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers. Further it would have been obvious to modify the combination above by using other disclosed materials, such as Ti, Cr, Mn, Co or Ni, in place of the Mo layer in example 3 based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed materials, such as Ti, Cr, Cu, Mn, Pd, Co, Ag or Ni, in place of the Al reflective layer in example 3 based upon the disclosure of equivalence and/or it would have been obvious to use substrate with other pitches, such as 0.6 microns to increase the data density.

The applicant argues that none of the references applied in the rejection disclose the use of a interfacial layer. This has been addressed by the addition of Kojima et al. '837. The examiner has also cited Inoue et al. '733 and Yamada et al. '063, below to establish that this is well known in the art.

5. Claims 2-5,7-11,16-18, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirota et al. JP 05325261, in view of Kojima et al. '837.

Hirota et al. JP 05325261 in section [0061] (JAPIO machine translation attached) describes a 360 nm dielectric layer, a 25 nm phase change recording layer, a 20 nm upper dielectric layer, a 15 nm $Ti_{95}Al_5$ thermal expansion relief layer, a 130 nm $Pd_{0.001}Hf_{0.01}Al_{0.99}$ reflection layer, and a 40 nm $Ti_{95}Al_5$ strengthening layer. In section [0066] the uppermost layer is replaced with 40 nm of Ti. The thermal expansion relief layer may be Ti, Zr, Hf, Ta, Nb, Rh, and W and may be alloyed with V, Sn, Cr, Au, Ag, or Cu in amounts of less than 20 % [0023]. The thickness of the thermal expansion relief layer may be 10-30 nm [0026]. The reflection layer may be Au, Ag, Cu, etc., and alloys thereof with a thickness of 30-300 nm [0027-0029]. The strengthening layer may be Ti, Zr, Hf, Ta, Nb, Rh, W or alloys thereof in thicknesses of 20-100 nm [0031-0033]. The recording layer thickness may be 10-30 nm. [0044].

It would have been obvious to modify the cited example of Hirota et al. JP 05325261 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers and further it would have been obvious to use other disclosed materials or thicknesses, such as Ti, Zr, or Nb and 30 nm, in place of the 15 nm $Ti_{95}Al_5$ thermal expansion relief layer in the example based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed materials, such as Ag or Cu, in place of the $Pd_{0.001}Hf_{0.01}Al_{0.99}$ reflection layer in

the example based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed materials or thicknesses, such as Ti, Zr, or Nb and 50-100 nm, in place of the 40 nm $Ti_{95}Al_5$ strengthening layer in the example based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed recording layer thicknesses based upon the disclosure at [0044].

The response above is relied upon as the rejections were not argued separately.

6. Claims 2,3,5-9,11,16,18, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada JP 05-159360, in view of Kojima et al. '837.

Okada JP 05-159360 in the example uses a 140 nm lower dielectric layer, a 20 nm phase change recording film, a 220 nm upper dielectric, a 50 nm Ti absorption layer and a 50 nm Al reflection/radiating layer. (page 11 of translation, [0011]) The absorption layer may use Ti, Ni, W, Mo, V, Nb, Cr, or Fe and the reflective layer may be Al, Cu, Au, or Ag. ([0009], pages 9 and 10 of the translation)

It would have been obvious to modify the cited example of Okada JP 05-159360 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers and further it would have been obvious to use other disclosed materials, such as Ni, Mo, V, CR, Fe, or Nb, in place of the Ti layer in the example based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed materials, such as Ag or Cu, in place of the Al reflection layer in the example based upon the disclosure of equivalence

The response above is relied upon as the rejections were not argued separately.

7. Claims 2,3,5-9,11,16,18,21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obayashi et al. '039, in view of Kojima et al. '837.

Obayashi et al. '039 in example 5 has a 260 nm dielectric layer, a 35 nm recording layer, a 10 nm upper dielectric layer, a 40 nm Nb layer and a 90 nm Al alloy reflective layer. Example 6 has a 240 nm dielectric layer, a 30 nm recording layer, a 5 nm upper dielectric layer, a 50 nm Nb layer and a 30 nm Al alloy reflective layer. Example 10 has a 220 nm dielectric layer, a 20 nm recording layer, a 10 nm upper dielectric layer, a 40 nm Mo layer and a 90 nm Al alloy reflective layer. Examples 18,19,21,26,28,29 and 38 also use metals of alloys meeting the limitation of the claims in the light absorbing layer. Useful reflective layer materials including Al, Ag, Au, Cu and alloys with other materials (8/34-62). Useful absorbing layer materials which are useful in thicknesses of 25-200 nm include Ti, Zr, Hf, Cr, Ta, Mo, Mn, W, Nb, Rh, Ni, Fe, Pt, Os, Co, Zn, and Pd (5/10-6/18).

It would have been obvious to modify the cited example of Obayashi et al. '039 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers and further it would have been obvious to use other disclosed materials, such as Mn, Co, Ni, Cr, in place of the Nb, TI or Mo layer in the example based upon the disclosure of equivalence and/or it would have been obvious to use other disclosed materials, such as Ag or Cu, in place of the Al reflection layer in the example based upon the disclosure of equivalence.

The response above is relied upon as the rejections were not argued separately.

8. Claims 2,3,5-11,16,18, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohno et al. '166, in view of Kojima et al. '837.

Ohno et al. '166 in examples 4,8,9,12 and 14 and comparative examples 6-8, which use 40 nm thick Ni, Co, Cr, V, Pd, Ti, Zr and Ge layers directly below Ag reflective layers. The

silver layers may be 30-300 nm thick (23/25). The intermediate layer may be of various materials and may be 50 nm thick. (21/24-33)

It would have been obvious to modify the cited example of Obayashi et al. '039 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers.

9 Claims 2,3,5-11,16,18 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Ohno et al. '166, Obayashi et al. '039, Okada JP 05-159360, Hirota et al. JP 05325261 or Zhou '573 in view of Kojima et al. '837 and further in view of Sekiya et al. EP 0359114.

Sekiya et al. EP 0359114 in examples 13-17 and 24-25 in table 1 on page 4.The use of the Ti alloy provides increased resistance to oxygen, water, chlorine and acids from the resins, environment and other layers.

In addition to the basis set for the for the combination of either of Ohno et al. '166, Obayashi et al. '039, Okada JP 05-159360, Hirota et al. JP 05325261 or Zhou '573 with Kojima et al. '837, the examiner holds that it would have been obvious to modify these combination to use of protective Ti layer taught by Sekiya et al. EP 0359114 as providing increased resistance to oxygen, water, chlorine and acids from the resins, environment and other layers with a reasonable expectation of gaining these benefits.

10 Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terao et al. '986, in view of Kojima et al. '837

Example 1 coats a 20 nm thick Ti island film having columnar structure as shown in figure 2. The thickness of these layers may be preferably 10-450 nm (6/49/7-3). The materials

disclosed as recited in column 11 and include Cr, Ti, V, MN, Fe, Co, Ni, Cu, Zn, Zr, Nb and Mo.

It would have been obvious to modify the cited example of Obayashi et al. '039 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers and further it would have been obvious to one skilled in the art to modify the invention of example 1 by using other thicknesses up to 450 nm based upon the disclosure of equivalence as well as to use other metals as disclosed with a reasonable expectation of achieving comparable results.

11 Claims 2-4,7-13,16-18, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. '932, in view of Kojima et al. '837.

Miyamoto et al. '932 teach phase change optical recording media which have two or three reflective layers as shown in figures 3-5. The closest of these to the recording layer must have more than 60% Al, Ag, Au, Pt or Pd. The second layer must have a larger percentage of these. (2/3-10) The third layer must have a larger percentage of these. (13/32-43) It is preferred that the first layer contains 70-85% of these metals.

It would have been obvious to modify the cited example of Obayashi et al. '039 by adding interfacial layer as taught by Kojima et al. '837 to prevent migration between the layers and further it would have been obvious to one skilled in the art to use alloys of Cu, Pd or Ag, rather than the Al alloys of the examples with a reasonable expectation of achieving comparable results.

13 Claims 2-4,7-18,21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. '932, in view of Kojima et al. '837 and Obayashi et al. '039

It would have been obvious to add absorption compensation layer as taught by Obayashi et al. '039 combined with Kojima et al. '837 to the phase change recording media of Miyamoto et al. '932 with a reasonable expectation of gaining the advantages ascribed to the absorption layer.

14 Claim 20 is allowable over the prior at of record. There is a teachings that the cooling of the particles which results in a coarser film maybe achieved using impact with inert gas atoms as a cooling mechanism. This provides motivation to increase the pressure, but not to increase the flow rate of argon

15 The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Inoue et al. '733 (7/53-8/24) layers 1b and 2a in figure 2 and Yamada et al. '063 8/52-11/26, layers 8 in the figures, teach the use of barrier layers between the recording layer and adjacent dielectric layers to prevent migration of materials between these, which leads to a decrease in the recording charactoristics.

16 Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

17 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

September 22, 2003